EXPLORING THE HEART OF LOGISTICS

Contract Repair Asset Visibility Around the Corner: The CRISP Pilot

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Introduction

Military operations are becoming more nonlinear, distributed, and adaptive—a trend that must continue at a rapid pace. Logistics becomes more of a challenge under these conditions.[1] The transformation of US military forces defies all progress made in the field of logistics, its business processes, and its supporting systems. It invites self-synchronization of supply and demand networks so that orders are fulfilled adequately. Key to this self-synchronization is an accurate global view of operations, from location of demands to location of supplies. Visibility is crucial. Some technologies enabling visibility—for instance, radio frequency identification—are quite complex, cutting-edge, and expensive while others are readily available, increasingly simple, and can be applied now. About 2 years ago, a Defense Sustainment Consortium (DSC) team investigated the application of one of these readily available technologies to contract repair parts supply.

The Pilot

The DSC sponsored a pilot program through the Defense Logistics Agency (DLA) with the Air Force called Contract Repair Information System Protocol (CRISP). The team included participants from the Air Force Materiel Command, Warner Robins Air Logistics Center, Defense Logistics Agency, Defense Automated Addressing System Center (DAASC), Rockwell Collins, ICF Consulting, and Altarum. The pilot focused on applying XML technology (extensible markup language) to enable automatic real-time reporting of repair status between commercial repair contractors and the Air Force and evaluated its impact on the contract repair parts supply process.

Altarum's role in the CRISP pilot was to conduct the project demonstration and evaluate its performance. The mission of Altarum is to transition cutting-edge supply network innovations into a practice that results in a business value to clients, who can continue to reap the rewards of improvements. Altarum saw a an opportunity for Air Force Supply Chain managers to have increased visibility into the contract repair supply chain network. Piloting the XML-enhanced communication between repair contractors and the Air Force would allow measuring the worthiness of the proposition and crafting the transition of the technology for wider use within the Air Force and Department of Defense (DoD).

Rockwell Collins was to represent a typical OEM* who serves as a repair depot for the Government (Air Force). Rockwell Collins participated in the CRISP pilot for two main reasons. First and foremost, Rockwell Collins is a leader in the use of information technology in its daily operations and realized this would be an opportunity to help determine future requirements for transfer of data between repair contractors and the Government. Second, it perceived other benefits of a successful CRISP pilot, including the elimination of manual data entry into multiple government systems, timely and accurate data available to the customer without having to contact Rockwell Collins, and timely and accurate performance metrics.

DAASC's role was to be the interface between a DoD automated supply system and a private sector contractor that is providing logistics support services. In this case, Air Force Materiel Command's (AFMC) prototype Logistics Management System is exchanging contractor repair status information with Rockwell Collins. As a value-added service provider and an eBusiness hub, DAASC provides the telecommunications link between the two partners and, in the future, may provide translation services to allow systems using dissimilar data formats to exchange data. DAASC chose to participate in this pilot because this is a natural extension of the services it has been providing for 30+ years. DAASC likes to take advantage of these opportunities to establish new relationships and gain experience with new transmission protocols such as XML.

ICF Consulting's role in the pilot was to act as the technical lead in the team effort to develop system requirements, design, development, and implementation. ICF Consulting provides technical consulting to a wide range of federal, state, and local government agencies. For the pilot, ICF was excited about participating in a cutting-edge project with significant potential for positive impact on DoD logistics support, increasing company expertise and experience in technologies, and working with the highly capable members of the team.

The Contract Repair Parts Supply Process

The Air Force contracts with private companies to produce, maintain, and repair a substantial part of its inventory. Military

(Continued on page 44)

(Inside Logistics continued from page 28)

maintenance work contracted out to the private sector has been significant as the private sector is contracted to do about half the work needed. It is commonly referred to as contract repair. Responsibility for the material sent to contractors for repair lies with AFMC, the three Air Force inventory control points, DLA, and repair contractors. Repair contractors are obligated to repair parts within a specific period and to report asset status weekly. Contractors use the Air Force legacy system (G009) to report end-items status, usually via manual data entry at the contractor facility. This is the only way to convey to the Air Force the contractor inventory picture once repair items have left the Air Force depot to be repaired at a contractor site. Government users, however, see the available data in G009 as unreliable because they often are outdated, incomplete, and inaccurate because of the long update cycle and manual nature of the inputs. Providing status data can be time consuming to the contractor and expensive for the Government, although the cost of this manual data input is included in the cost of repair. Item managers and production management specialists are forced to rely on regular telephone calls to the contractor to check on the progress of needed repair items.

Availability of contract repair parts impacts the availability of the weapon systems, which, in turn, impacts mission capability. During Operation Iraqi Freedom, there were shortages of spares and repair parts needed by deployed forces. To mitigate such a shortage and continue to carry out the mission, units resorted to cannibalizing vehicles or getting around normal supply channels to keep equipment in ready condition. Item managers need timely and accurate data to provide realistic delivery dates to customers. They need to spend less time chasing information and more time managing items to meet customer needs. They need visibility into the supply network that they are supporting so they can assess, analyze, and modify plans. This would allow them to sense and respond adequately to demands.

As it stands, resolving issues can be time consuming—confusing at best—and take supply chain professionals away from planning repairs and providing their customers with quality support.

Trends: The Power of Visibility (Why Change the Process?)

The Air Force is striving to achieve greater collaboration with its supply base to obtain greater connectivity and interoperability of logistics system, enabling the timely ordering, tracking, and delivery of supplies through the pipeline. One of the priorities, not only for the Air Force but also for the whole of DoD, is to create a common operating view and improve data quality. Knowing the health of one's network allows for better planning, execution, and flexibility. In industry, companies such as Hewlett-Packard Enterprise have enforced Zero Latency Enterprise whereby integration of real-time data and business processes across the enterprise support real-time actions. A benefit is a decrease in order cycle time by enhancing real-time visibility of inventory. This sort of visibility is exactly what the DoD is looking for. In a recent General Accounting Office report, "Defense Logistics: Preliminary Observations on the Effectiveness of Logistics Activities During Operation Iraqi Freedom," it was found that asset visibility and other logistics systems were not fully interoperable and data were not entered into asset visibility and other logistics systems in a uniform and consistent manner.

To better achieve asset visibility of items in repair, the DoD has adopted the Commercial Asset Visibility (CAV II) program developed by the Navy Supply Information Systems Activity (NAVSISA) to track depot-level repair items at a commercial contractor site. This program is Web-based and provides the commercial repair contractor direct access through the Web to the Navy or Army CAV II system to enter repair status. The contractor receives immediate validation feedback on data entered. For those contractors that maintain an internal mainframe system to track assets at their facility, entering data in the CAV Web system and their internal tracking systems causes them to perform double entry of repair transactions into two tracking systems with the possibility of data entry errors causing the two systems not to match on status.

A Pilot In Motion: Picking Up on Trends

The Navy and the Army currently use the CAV II system that provides visibility of items undergoing repair in commercial contract sites. As AFMC is adopting CAV II, contract repair items handled at the air logistics center (ALC) will be phased out of G009 and transitioned into the CAV II system.

To assist in alleviating the double data entry and provide the Air Force item manager better visibility, less errors, and increased data visibility on a timelier basis, the CRISP pilot program focused on using XML technology to transmit repair transaction data directly from the contractor software system through DAASC to an Air Force test site, resulting in a single data entry at the contractor site.

The CRISP Development Team built an XML schema and business object documents and connected the Air Force ALC at Warner Robins to Rockwell Collins in Cedar Rapids, Iowa, via DAASC. The nature of the transactions was receipts, inductions, completions, shipments, and any reversal actions of those four transaction types, if necessary. Because CAV II was not yet in use, a test application was built to view asset status, as well as a few other practical reports (flow days report and a production management specialist report). The reports allowed users to see what had been received to date at the contractor and what had been inducted, completed, and shipped to date. The application was updated every hour from the contractor systems. The pilot did not depend on any manual data entry whatsoever. The data are fed automatically to the test application via XML from the contractor internal tracking system. The test scope was of one contract, with four contract lines and four different stock numbered end items for repair.

A Trend Put to the Test: Benefits (Lining Up with Air Force Expectations)

Since CRISP used a Web-based XML language to interact with the contractor system, it has the capability to transmit updated repair status on a near real-time basis when the contractor updates its internal system. It provides timely status to the item managers and production management specialists. This fact alone alleviates the many telephone calls required by the item manager to check the status of a repair and, in addition, provides additional repair data related to changes in repair turnaround time and awaiting parts conditions.

CAV II currently provides contractors much the same capability of sending repair status directly from their internal systems to CAV through the CAV EDI program, which utilizes the EDI ANSI X12 language set. The difference between EDI X12 and XML is twofold. EDI X12 is very costly to implement at a

contractor site and is difficult to learn, resulting in a lengthy development and implementation cycle. Although the Navy uses EDI ANSI X12, only three contractors have been willing to underwrite the high cost of implementing the ANSI X12 technology. In addition, X12 transactions are processed through the Navy Ecommerce System in an end-of-day batch environment only, not interactive to CAV directly as XML would be. XML development at Rockwell Collins during the CRISP pilot took only a short time to develop and implement, all at a low cost (1300 hours at a cost of $100 per hour). The XML implementation is not dependent on volume of contracts or items repaired but represents the efforts to implement the protocol itself.

Pilot Impact: Why Is this Stuff Important, Why Does It Matter? What Has this Pilot Done?

So what is the impact of employing XML technology to contract repair parts supply? For one, it offers the Air Force and, possibly, DoD an incredible opportunity to institutionalize contract repair visibility across its supplier base, enabling the creation of a dynamic support network. While it is not equivalent to the magical snapping of the fingers, it offers some real power to logisticians: the power of information, giving logisticians a long, hard look into the networks they manage so they can better plan and respond to the unusual.

The team found that the item managers and the production management specialist were using G009 only on a monthly basis to figure out what happened for the previous month. To compensate for the limitations in G009, the Air Force worked with the contractor to provide supplemental repair status data in a weekly spreadsheet. This spreadsheet and CRISP were comparable because they each referred to individual serial numbers, and this made it easy to know what was accounted for and what was not.

The CRISP pilot was evaluated for technical performance and business impact. The business impact considered both the operational benefit and cost justification. Furthermore, items in the pilot were evaluated in terms of their issue and stock effectiveness, customer wait time, funded undelivered status, back-order status, and flow days. Users expected that enhanced visibility would yield significant operational benefit. Although there may have been some improvement in customer wait time, back orders, and mission capability (MICAP) hours, the pilot period of 4 months was insufficient to observe significant operational benefits. Actual flow-day reports are not presently available in G009. They are made available to the Air Force on a weekly basis for this specific contract via the supplemental spreadsheet discussed above. The pilot for CAV-XML offered actual flow days computed on each depot-level reparable being repaired, from the day it was received at the contractor to the day it was shipped. It also tracked days in work thus far, allowing item managers and production management specialists to act and communicate with contractors when days in work were approaching contracted flow days.

The analysis of flow days showed that, for all items on which work had been completed and which had been shipped back, as many as 45 percent had exceeded contracted flow days. Through discussions with the item managers and production management specialists, it was apparent that communication is crucial for these items. Indeed, the information manager and the production management specialist want to know what is holding up these items and what is the updated forecasted ship date. The pilot definitely raised Air Force staff awareness by providing increased visibility.

The pilot team had anticipated the number of funded undelivered to decrease under the influence of CAV-XML. The degree to which the item manager could rely on the CAV-XML would allow for more frequent ordering of lesser quantity, thus decreasing funded undelivered and speeding up the cash flow cycle. The short duration of the pilot did not allow seeing how future orders could be impacted.

CAV-XML informed the Air Force when an item on an order was completed and shipped. The visibility afforded in the project allowed supply chain managers to have a more accurate view of their supply and to update their system with that transparency.

Customer wait time and issue effectiveness were expected to be impacted where days in work were approaching contracted flow days. Item managers, as well as production management specialists, were able to have enhanced visibility and had the opportunity to take action to minimize the item's turnaround time, but both remained an issue throughout the duration of the pilot as the repair parts supply process was subjected to real external constraints. With CRISP, the Air Force could verify near real time what items had been received at the contractor against the order and make sure all items were received. This allowed indirect shipment monitoring by the Air Force.

From the flow-day analysis, one stock number (and its interchangeable national stock number) made up for 54 percent of late items. This was consistent with MICAP hours for the same stock number. The report for MICAP showed some improvements throughout time. The data also indicated that MICAP hours could be caused by longer than contracted flow days.

Total asset visibility is not quite magic yet, but it allows the ability to determine the cause of problems with more ease even if it does not necessarily lead to a solution to the problem. Access to flow days allows the Air Force contracting offices to have measures in hand and to meet with their suppliers to discuss options available to them. The pilot allowed the Air Force to see the state-of-the-inventory picture. Equipped with that knowledge, Air Force logisticians have the potential to better respond to the customer and better collaborate with suppliers.

So, if there is a clear logistics advantage to access to timely and accurate information, is there an equal economic advantage as well? The pilot team carefully examined the cost of employing this technology against the cost of its alternatives. Was it worth it, or was this tech tool too cost prohibitive?

The cost model for the business case considered three alternatives. The first alternative was CAV II, where updates are no longer weekly but daily and where manual data entry at the contractor is still the way of life. The second alternative was CAV II-XML, enabled by CRISP technology with the elimination of manual data entry at the contractor, and near real-time update of information. The third alternative was CAV-EDI, enabled by EDI with near real-time update, no manual data entry at the contractor, but a substantial cost to implement.

The cost model for the business case accounted for several cost categories:

- Air Force cost of searching for information
- Implementation costs for each alternative
- Contractor cost of responding to Air Force search for information
- Contractor cost of reporting item status.

Other elements were taken into account such as discount rates and penetration rates, which consider the proportion of contractors that are likely to adopt and implement the solution,

and a time line of 3 years to compare the cost of the different solutions identified.

The cost categories were considered across the three possible alternatives. All costs usually are passed to DoD, either as direct charges or embedded in overhead rates or prices. The costs associated with developing the remaining message formats needed for full operational deployments were included in these costs.

The cost analysis shows that adding XML capabilities to CAV II is much less expensive than adding EDI capabilities, with essentially the same benefits. The benefits of adding XML or EDI to CAV II come from the reduction in labor, specifically at the contractors, as data entry is automated and as item managers and production management specialists make fewer calls to contractors to find out about the status of parts in the repair process. These reductions amount to a cost avoidance that is much greater than the cost of implementing CRISP, whereas in the EDI case, the implementation costs are high enough to eliminate any savings for more than 3 years.

Twenty-eight contractors were identified as good candidates to implement the XML capability. These 28 contractors represent 90 percent of the total Air Force transaction volume, 66 percent of the depot-level reparables, 8 percent of contractors, 3 percent of contracts, and 2 percent of the Air Force contracts' total value. There always will be some companies that resist change or will not be able to implement XML capability. Because the Air Force will expect and pay for the contractor to obtain such capability, 90 percent of the 28 contractors identified as good candidates are likely to proceed with an XML implementation. The Air Force would not have to pay for manual data entry any longer. Some Air Force contractors outside the 28 identified may have enough transaction volume with the DoD to justify the implementation of CAV-XML. The Air Force also may be interested in automating the reporting process with some of the remaining contractors as part of its effort to enable asset visibility and create a sense-and-respond logistics force.

In summary, over the 3-year time line, CAV II would cost about $92M, CAV-XML would cost about $66M, and CAV EDI would cost about $93M. The most significant savings for the CAV-XML solution are in the labor costs of manual data entry and information search and response.

Trend: A Reality?

Some of us who may have had the experience in working with these types of pilots realize there is a tendency to relax once success has been demonstrated and that things seldom progress into actual production status. Unless a strong focus is maintained, the work accomplished for the pilot never will be applied to support day-to-day operations.

Not the case here. The power of information not only is well publicized but also is pervasive in many areas of our lives. Air Force users are ready for this technology. When a trend is supported by its acceptance, concrete benefits, and a real cost advantage, it persists and infiltrates all the de facto standards by which society operates.

CRISP demonstrated a *win win* when the Government and industry share information and make a good business case for each. The CRISP connection worked, and the Air Force plans to adopt it. Item managers expect to be able to better support the warfighters. The success of CRISP is expected to spawn other opportunities for government-industry information sharing under the Deputy Director for Supply Management at the Directorate of Logistics for Headquarters AFMC, Edward C. Koenig III directive.

A technical configuration meeting was held in Mechanicsburg, Pennsylvania, where a technical interface overview took place to describe the process to transition CRISP technologies into production CAV II. The Air Force is now working with the CAV Team on an implementation strategy and time line.

Currently, repair contractors are paid for reporting requirements using the Air Force application G009. Rockwell Collins and other pilot contractors report that the loss of reporting revenue is not significant and that it would not be a barrier to adopting direct connections with their government customers. They do not see the reporting as desirable work and are more interested in developing new ways to support their customers. They are also interested in reducing the support costs associated with responding to queries from production management specialists.

Contractors also are interested in business process consistency across contracts and DoD customers. CRISP provides an opportunity for a common method of reporting repair status that is consistent across all military services. While the cost of automatic reporting is significantly less than the cost incurred when relying on manual methods, there are costs associated with configuration and maintenance of the information technology systems that perform the function. It would be helpful for contractors to have a consistent funding model that can be applied routinely to contracts with automatic repair-status reporting requirements. For the CAV-XML alternative, the service funds the contractor for automatic data reporting. Contractor costs primarily are associated with establishing the capability for automatic XML reporting, setting up new contracts, and operational status reporting. While many funding strategies are possible, the CRISP Team suggests a cost recovery strategy where the contractor is funded separately to establish and operate automatic status reporting for each contract.

Transitioning a Pilot

The CRISP solution can be deployed at various levels. These levels range from narrow use of CRISP to provide the Air Force with enhanced access to repair status information to broader application of CRISP, where the CRISP approach would be used to share additional information with repair contractors or where other services would utilize CRISP-initiated XML transaction sets for contractor repair status. For each of these uses, a champion is needed to promote adoption of the CRISP solution.

Headquarters AFMC is championing the use of CRISP for better Air Force access to contractor repair status information. The ALCs are the most immediate beneficiaries of this improved access and would promote adoption of CRISP technology to their repair contractors. AFMC would serve as the technical point of contact to facilitate direct connections with contractors. Core to this support is AFMC's adoption of the CAV-XML interface (the CRISP software component) as an operational component of the CAV application. AFMC and the air logistics centers are motivated to champion CRISP to provide better support for their respective customers. Transitioning this pilot into a production system involves the role of DLA DAASC as the common interface between contractors and DoD information systems. DLA DAASC is the appropriate organization to own the XML transactions, perform routing to appropriate application sites, and execute mapping between specific formats. DAASC is positioned to encourage other services to use the CRISP XML transactions and

processing methods. DAASC will *own* the CRISP transaction definitions and is motivated to champion CRISP as part of its mission to encourage common DoD adoption of best electronic commerce approaches.

Pilot and Lessons Learned

Developing new technology and evaluating it in a live pilot, with many organizations participating, is always a challenge and this project was not an exception. There are several areas for lessons learned from this pilot. The first area is the dilemma of data synchronization. The CAV-XML approach requires government databases to be synchronized with contractor databases. Methods are needed to verify and correct differences. The pilot encountered several data synchronization issues. One issue was related to initializing databases at startup. Another issue was propagating changes to the participants. Finally, there was a need for data, tools, and analysis to determine if there were problems and to troubleshoot problems for resolution. The second area is the area of security. Issues around security can arise, and a backup plan can be helpful. To mitigate these issues, the architecture must be flexible; the DAASC role was most helpful. In this case, DAASC was ready to start the routing process for the pilot when new government orders were issued that prevented access through the DAASC firewall. The CRISP architecture was flexible enough that routing could be achieved through ICF Consulting while the Air Force would work with DAASC on authorizing actions for transactions routing. The third area concerns user interface. CRISP is information-sharing technology that is nearly invisible to the end user. When CRISP is doing its job, the data in CAV II are more timely and accurate, but CAV looks the same. This background capability is hard for users to evaluate. In this case, a test application was needed to provide users access to the information being shared with CRISP. Users tend to focus on the user interface, which in a pilot evaluation can never be as functional or mature as a production product. The lesson learned is to avoid, wherever possible, prototype user interfaces. Last, the area of supply chain performance seems to make Headquarters Air Force part of the solution. Metrics were tracked and observed. Users recognized the value of the pilot that afforded them an enhanced view of operations in a timely fashion, but the pilot application itself did not resolve supply chain performance issues. Visibility encourages measuring the supply chain network and enhancing collaboration between supply chain partners to resolve performance issues. Visibility does not solve supply chain performance but gives the visibility to empower organizations and people to do so.

Conclusion

Central to the idea of the next steps for CAV-XML is the idea of supplier collaboration and total asset visibility. The DoD has released directives for serialized item tracking and use of radio frequency identification (RFID), as well as unique identifier tracking. These components can be enabled easily and accommodated by XML by allowing an RFID field, serial number field, or an identifier field to be tracked and communicated and to exist within the schemata and document type definition.

Collaboration is a two-way street whereby the DoD and the Air Force can better communicate their needs to the supplier, from the point of forecasting repair to communicating repair priority and point of need (customer and customer location). This will be important in specifically linking government and contractor information systems so each has direct access to information that was previously held internally and only released intermittently as reports.

Some of the possible areas where CRISP technologies could be applied are the DD-1348, "DoD Single Line Item Requisition System Document," issue/release document, and automated packing list. These are provided to the contractor with the unserviceable depot-level reparables for repair. Often, it is the receipt of these physical unserviceable units that is the first indication to the contractor regarding repair. The lack of advanced notification to contractors limits their ability to plan and better meet the needs of their government customers. Contractors have suggested that they could better plan if they were to get an electronic copy of the DD-1348 when it is issued.

Another applicable area is repair priority notification. The virtual Internet Communications Protocol integrated management across the three air logistics centers generates a prioritization list of items every day for organic repair, using the Execution and Prioritization of Repair Support System. There has been an effort within AFMC to provide a similar prioritization for contractor repair. This initiative was suspended, in part, because of data currency problems in legacy systems with contractor repair production counts. Use of CRISP should improve the quality of contractor production data, so restarting this effort may be appropriate.

The DSC Contract Repair Information System Protocol Project took on a longstanding problem and examined several possible solutions. CAV-XML was put to the test, and the pilot proved that XML transactions are fully functional and can be relied upon. CAV-XML offers a tangible solution to the lack of visibility into the contractor repair cycle. The Air Force plans to adopt CAV-XML and is actively working with NAVSISA to plan its deployment. Funding has been identified to move forward. CRISP was an excellent project that proved the ability to cost-effectively transfer data between contractors and the Government. Rockwell Collins, as other repair contractors, is looking forward to future opportunities that will further reduce manual data input, improve data integrity, and improve data timeliness. This pilot is one of the small steps taken by DoD, specifically the Air Force, toward transformation, enabling supply chain visibility and reaping its benefits. That journey promises to be much longer and marked by numerous progresses in technology that are oftentimes applicable to supply chain networks.

In preparation for Air Force implementation of CAV II, ICF Consulting is assisting AFMC by converting all CAV II EDI transactions into an XML standard approved by the DoD for logistics transactions. This effort will be completed by July 2005.

Notes

1. Office of Force Transformation, Operational Sense and Respond Logistics: Co-evolution of an Adaptive Enterprise Capability, Concept Document (Short Version), 2004.

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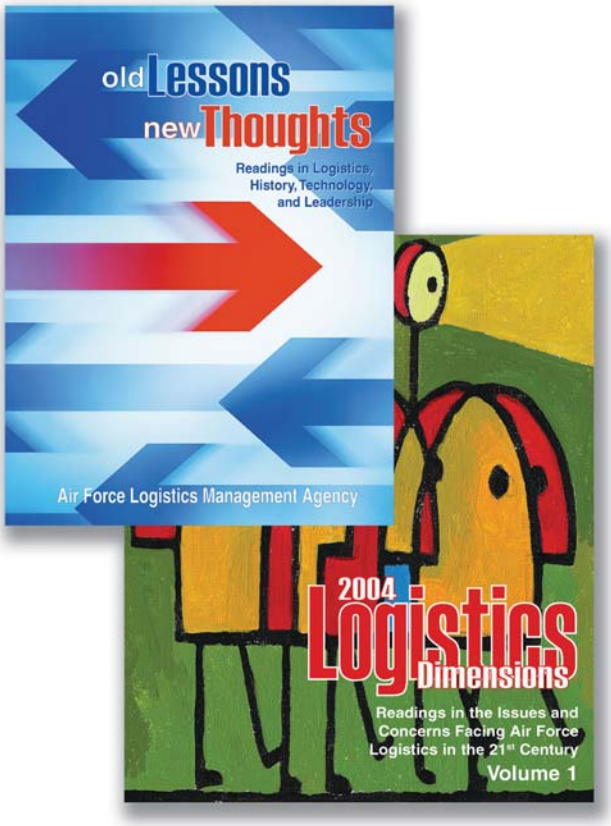

The Editorial Advisory Board selected "Global Combat Support System: A Must for the Joint Warfighting Commander"—written by Lieutenant Colonel Bryan T. Newkiwrk, USA and Colonel Karen W. Currie, USAF—as the most significant article to appear in Vol XXVII, No 3 of the *Air Force Journal of Logistics*.